

CLAIMS

What is claimed is:

1. A hand held tool for setting a rivet comprising:
 - a rivet having a removable mandrel;
 - a mandrel collection system coupled to the rivet setting tool, the mandrel collection system configured to provide a first and second vacuum levels, said second vacuum level being sufficient to draw the mandrel from the rivet setting tool into the mandrel collection system.
2. The hand held tool according to Claim 1 wherein the first vacuum level is less than the second vacuum level.
3. The hand held tool according to Claim 1 wherein the mandrel collection system comprises an air supply module, a vacuum control module, and a collection bottle.
4. The hand held tool according to Claim 1 wherein the mandrel collection system comprises a shuttle valve which is moveable from a first position to a second position and wherein the mandrel collection system provides a first vacuum level when the shuttle valve is in a first position and a second vacuum level when the shuttle valve is in the second position.

5. A hand held tool according to Claim 4 wherein the shuttle valve is actuated by movement of an actuator piston within the rivet tool.

6. The hand held tool according to Claim 5 wherein the actuator piston defines an air passage configured to couple the shuttle valve to a source of compressed air.

7. The hand held tool according to Claim 4 wherein the shuttle valve is actuated by air pressure.

8. The hand held tool according to Claim 1 wherein the mandrel collection system comprises a needle valve configured to regulate the first vacuum level.

9. An apparatus for setting a fastener having a mandrel, the apparatus comprising:

an air supply module;

a vacuum control module coupled to the air supply module;

a collection bottle defining a sealed collection cavity;

wherein the vacuum control module is configured to provide first and second vacuum levels within the sealed cavity, said second vacuum level being sufficient to draw the mandrel into the sealed cavity.

10. The apparatus according to claim 9 wherein the vacuum control module is fluidly coupled to the air supply module.

11. The apparatus according to claim 9 wherein the vacuum control module defines a high flow passage and a low flow passage, said passages being fluidly coupled to a vacuum actuator.

12. The apparatus according to claim 11 wherein the vacuum control module comprises a shuttle valve configured to restrict the flow through the high air flow passage.

13. The apparatus according to claim 12 comprising a needle valve configured to restrict air flow through the low flow passage.

14. The apparatus according to claim 13 wherein the shuttle valve is actuated by compressed air.

15. The apparatus according to claim 13 wherein the shuttle valve is actuated by movement of a rivet setting tool actuation piston.

16. The apparatus according to claim 15 wherein the actuation piston comprises an actuation air passage and wherein the shuttle valve is configured to move in response to compressed air flowing through the actuation air passage.

17. The apparatus according to claim 16 wherein the apparatus defines a pressure chamber fluidly coupled to the air actuation passage, said pressure chamber having a bleeder orifice configured to release air pressure from the pressure chamber at a predetermined rate.

18. The apparatus according to claim 17 wherein the pressure chamber has a bleeder disk, said bleeder orifice being defined within the bleeder disk.

19. The apparatus according to claim 9 wherein the first vacuum level is not sufficient to draw a fastener into the sealed cavity.

20. An apparatus for moving a portion of a fastener, the apparatus comprising:

a vacuum control module;

a member defining a generally sealed cavity;

wherein the vacuum control module is configured to provide first and second vacuum levels within the sealed cavity, said second vacuum level being sufficient to draw the fastener into the sealed cavity, while the first vacuum level is not sufficient to draw the fastener into the sealed cavity.

21. The apparatus according to claim 20 wherein the vacuum control module defines a high flow passage and a low flow passage, said passages being fluidly coupled to a vacuum actuator.

22. The apparatus according to claim 21 wherein the vacuum control module comprises a shuttle valve configured to restrict the flow through the high air flow passage.

23. The apparatus according to claim 22 comprising a needle valve configured to restrict air flow through the low flow passage.

24. The apparatus according to claim 23 wherein the shuttle valve is actuated by compressed air.

25. The apparatus according to claim 23 wherein the shuttle valve is actuated by movement of a piston.

26. The apparatus according to claim 25 wherein the piston comprises an actuation air passage and wherein the shuttle valve is configured to move in response to compressed air flowing through the actuation air passage.

27. The apparatus according to claim 26 wherein the apparatus defines a pressure chamber fluidly coupled to the air actuation passage, said pressure chamber having a bleeder orifice configured to release air pressure from the pressure chamber at a predetermined rate.

28. An apparatus for moving a portion of a fastener, the apparatus comprising:

a means for controlling a vacuum level;

a member defining a generally sealed cavity;

wherein the means for controlling a vacuum level is configured to provide first and second vacuum levels within the sealed cavity, said second vacuum level being sufficient to draw the fastener into the sealed cavity, while the first vacuum level is not sufficient to draw the fastener into the sealed cavity.

29. The apparatus according to claim 28 further comprising a means for actuating the means for controlling the vacuum level.

30. The apparatus according to claim 28 wherein means for controlling a vacuum level defines a high flow air supply and a low flow air supply, said air supplies being fluidly coupled to an actuator that is configured to convert air flow to a vacuum.

31. The apparatus according to claim 30 wherein the means for controlling a vacuum level comprises a first means to restrict the flow through the high air flow supply.

32. The apparatus according to claim 30 wherein the means for controlling a vacuum level comprises a second means to restrict the flow through the low air flow supply.